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"KONTAKT" [Petroleum Sulfonic Acids  
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G. Petrov (Part B)]

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#### PART A

"Kontakt" is the name of a technical product available for sale, obtained by treatment of various oil distillates with fuming sulfuric acid or sulfur trioxide and consisting principally of a mixture of different sulfonic acids (see patents of G. S. Petrov).

"Kontakt" is obtained from the acid-treated oil (usually solar or spindle oil distillate) by extracting the sulfonic acids with small amounts of water or aqueous alcohol of 35 - 50% concentration. The oil is partly emulsified in the sulfonic acid solution and can be isolated by further addition of alcohol. Sulfonic acids remain in the aqueous alcohol solution. Thus, the manufacture of "Kontakt" is connected with utilizing waste materials resulting from acid treating of oil products.

The "Kontakt" can also be prepared from the black acid sludge, which is first diluted with water to eliminate the sulfuric acid, then treated with oil for the extraction of dissolved sulfonic acids. The latter are extracted from the oil solution with aqueous alcohol or acetone.

"Kontakt" is a dense sirupy liquid with blue fluorescence, soluble in water. Upon shaking, "Kontakt" solutions foam, similarly to soap solutions, and possess high detergent properties. Technical "Kontakt" contains about 40% sulfonic acid, 1-3% sulfuric acid, traces of iron, considerable quantities of oil (up to 15%) water and sometimes alcohol. The salts of sulfonic acid contained in the "Kontakt" formed by alkali metals are easily soluble in water and exhibit the character of soaps. Salts of alkali earths and heavy metals are only partly soluble or insoluble in water, but are soluble in alcohol and ether. When 20% fuming sulfuric acid is used for acid treating of the oil the yield of sulfonic acids is about 70% calculated as pure 100% sulfonic acids. The loss of the distillate amounts to 22 - 25%.

#### PART B

Researches of P. I. Shestakov and A. Yu. Rabinovich on the nature of sulfonic acids from vaseline oil established that sulfonic acids of "Kontakt" have an average molecular weight of 350. This, in connection with analytical data,

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indicates that they are monosulfonic acids  $C_{20}H_{27}SO_3H$ . Upon fractional extraction of sulfonic acids of "Kontakt" with ether from their mixture with sodium sulfate the first fraction corresponds to the formula  $C_{17}H_{21}SO_3H$ . Thus, the hydrocarbons from which "Kontakt" is formed belong to the series  $C_nH_{2n-12}$ . Apparently they have no olefinic bonds, since the sulfonic acids of "Kontakt" react neither with bromine nor with potassium permanganate. From higher boiling fractions of oil sulfonic acids with still higher molecular weight are obtained. Chemically pure anhydrous sulfonic acids of "Kontakt" are a solid transparent mass. They are soluble in water, alcohol, benzene, ether and other solvents. Upon heating with water under atmospheric pressure, they do not lose their sulfonic acid group.

The field of applicability of "Kontakt" is very substantial. The first important application is that covered by the fat-splitting process developed by G. S. Petrov, producing glycerin and free fatty acids with the aid of "Kontakt." For each 100 parts of washed fat, 50 - 60 parts water, 1 part "Kontakt" and 0.1 - 0.3 parts sulfuric acid are used. The duration of the process is up to 15 hours, and it involves two stops. The first lasts 8 - 10 hours; the second, in which fresh acidified water is used, 3 - 5 hours, until splitting of 90 - 95% fat has been achieved. To achieve 97 - 99% decomposition, 2 wt. per cent "Kontakt" calculated on the fat is used. The equipment for this process may be made of wood or iron, lined with lead. The "Kontakt" fat-splitting process is applied in soap making and glycerin manufacture by saponification with sodium carbonate. Apparently the hydrolysis of the fat in the presence of high molecular sulfonic acids, particularly "Kontakt," is facilitated by the presence of the two catalysts, sulfuric and sulfonic acids of the "Kontakt." The latter acts as an emulsifying agent, producing a fine dispersion of the fat, and this emulsifying effect is strengthened by mechanical mixing with steam or with the aid of a stirrer when the temperature of the process is below 100°. The manner of mixing is of essential significance. Fat splitting with the aid of "Kontakt" in closed tanks under slight pressure at temperatures above 100° is also possible. Whenever preliminary purification of the fat or oil is necessary, it should be done with dilute mineral acids. Use of pure distilled water or water freed of salts of calcium, magnesium and iron is desirable. Fat splitting with "Kontakt" is widely used in the U.S.A. and Europe. Twitchell Process Co. makes "Kontakt"-like products of grades DP and P, instead of the old Twitchell reagent, which consisted of aromatic sulfonic acids.

In the textile industry "Kontakt" is used in treatment of cotton and linen goods in bleaching and wetting for removal of oxides of metals and hydrolyzing starch. In bucking textiles "Kontakt" is used for removal of fats and waxes. In fluent dyeing it is used for preparing and boiling the material, especially heavy material dyed with sulfur or substantive dyes. "Kontakt" can be used for dyeing without preliminary sizing, using vat

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hydrosulfite dyes. In cold dyeing, "Kontakt" is used as a substitute of an alizarin oil or ricinoleic acid soap. For material dyed with black sulfur dyes or black aniline dye, treatment with an emulsion of vegetable or mineral oils and "Kontakt" pronouncedly increases the intensity of the color. In washing with neutralized alkali, "Kontakt" substitutes soap. In finishing textiles, "Kontakt" serves as a substitute for soap, glycerin, alizarin oil, and can also be used in cooking sizing material as a substance converting potato starch into dextrin. Because of its defatting properties, "Kontakt" is suitable for use in the manufacture of hygroscopic cotton for cooking oil-stained cotton ends and removal of oil spots from textiles. In washing dirty wool and in oiling wool yarns before spinning, "Kontakt" is used as an emulsion in vegetable or mineral oil. The detergent effect of "Kontakt" is due to the emulsifying action of the sulfonic acids upon fat, stability of their salts with respect to ordinary plant water and ability to soften hard water and thus enhance the effect of soap.

Of new fields of application of "Kontakt," the following can be noted: cold spinning of linen, cooking cellulose materials, softening of water, laundering; in leather tanning industry, fattening of skins, using a "Kontakt" emulsion, and their defatting; finally, "Kontakt" is used as a catalyst with which condensation of phenols with aldehydes can be carried out easily under atmospheric pressure in manufacture of carbolytes.

#### REFERENCES

1. Gurvich, L. G., Scientific Principles of Oil Refining, Moscow-Leningrad, 1925.
2. Shestakov, P. I., Bull. Soc. Improvement Development Textile M. Ind., Moscow, 1915, 322 ff.
3. Dobryanskiĭ, A. F., Analysis of Oil Products, Moscow-Leningrad, 1925.
4. Lomanovich, A. F., Bull. Textile Ind. Trade, Moscow, 1922, 6.
5. Petrov, G. S., Neftyanoe i slantsevoe khozyaĭstvo (Petroleum Shale Ind.) Moscow, 1922, 5 - 6.
6. Petrov, G. S., Azerbaĭdzhanskoe neftyanoe khozyaĭstvo (Azerbaijani Oil Ind.) 12, No. 12, 72, 1927.
7. Tilicheev, M. D. and Dumskaya, A. I., Azerbaĭdzhanskoe neftyanoe khozyaĭstvo (Azerbaijani Oil Ind.) 11, No. 11-12, 738 ff., 1926.
8. Val'gis, V., Azerbaĭdzhanskoe neftyanoe khozyaĭstvo (Azerbaijani Oil Ind.) 10, No. 5, 631 ff., 1926.